

2009

# Effectiveness of multi-sensory stimulation on anxiety and depression in people with Alzheimer's disease

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## Recommended Citation

Maunupau, Kamanu, "Effectiveness of multi-sensory stimulation on anxiety and depression in people with Alzheimer's disease" (2009). *Mental Health CATs*. Paper 4.  
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## Disciplines

Mental and Social Health | Occupational Therapy | Rehabilitation and Therapy

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# Effectiveness of multi-sensory stimulation on anxiety and depression in people with Alzheimer's disease

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**Date:** November 30, 2009

**Review date:**

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## CLINICAL SCENARIO:

Edna is a 68 year old woman who has been living in the same home with her husband for the past 35 years. Her children have all grown and started families of their own. Every Sunday Edna makes sure the entire family gathers for Sunday night dinner. However, about six months ago at family dinner night, Edna's daughters noticed recent anxiety and memory loss in Edna. The next week they took her to her primary Physician and found out that Edna has a moderate level of dementia. Edna was good at covering her memory loss because she has great social skills from her long time career as a hotel manager. Now Edna has many of the common symptoms of Alzheimer's disease such as depression, anxiety, aggression, and confusion. She no longer can independently care for herself and is losing function in her ADLs and IADLs. Her family worries that she is not happy and is just waiting around to die. They want to do the best they can for Edna and are prepared to do whatever it takes to ensure her happiness.

## FOCUSSED CLINICAL QUESTION:

In addition to medication, what is the best treatment for psychosocial symptoms in people with dementia?

## SUMMARY of Search, 'Best' Evidence' appraised, and Key Findings:

Of the five level I-II studies that examined the effectiveness of psychosocial therapy to reduce psychosocial symptoms in people with dementia, one (Williams & Tappen, 2008) examined the effects of exercise, two (Ozdemir & Akdemir, 2009; Baker *et. al.*, 2003) examined the effects of multi-sensory stimulation, and two (O'Connor, Ames, Gardner, King, 2009; Verkaik, van Weert, and Francke, 2005) compared the effects of various psychosocial methods in a systematic review.

The best evidence article is the Ozdemir & Akdemir (2009) article. This specific article was chosen because there is moderate evidence that multi-sensory stimulation is effective in reducing anxiety in people with dementia. The key findings of this article indicate that a multisensory stimulation method implemented to mildly-affected Alzheimer's patients has a positive effect on their cognitive state, and depression and anxiety levels. The effect of the multisensory stimulation lasted about three weeks following completion of the study, with a tendency to decline progressively (Ozdemir & Akdemir, 2009).

**CLINICAL BOTTOM LINE:**

Early rehabilitation efforts comprised of social and cognitive stimulation activities can positively affect Alzheimer's disease. Group differences buffer some effects because they support the use of multisensory stimulation in therapy. Therefore, when considering therapeutic activities for treatment, the use of multisensory stimulation method may be appropriate. Therapists must use their own judgment about which intervention to do with each patient. However, as more evidence-based interventions become available, the more therapists can choose from and individualize the treatment to each patient (Ozdemir & Akdemir, 2009).

**Limitation of this CAT:** This is not an exhaustive literature review. The reviewer is not an expert in this field area. This critically appraised paper has not been peer-reviewed.

**SEARCH STRATEGY:****Terms used to guide Search Strategy:**

- Patient/Client Group: dementia, geriatrics
- Intervention (or Assessment):therapeutic, multi-sensory stimulation
- Comparison: find the best current psychosocial treatment
- Outcome(s): not included in search

Databases and sites searched	Search Terms	Limits used
1. Medline – Ovid	1 <sup>st</sup> attempt: <ul style="list-style-type: none"> <li>• Dementia</li> <li>• Depression</li> <li>• Therapeutic</li> </ul> 2 <sup>nd</sup> attempt: <ul style="list-style-type: none"> <li>• Dementia</li> <li>• Depression</li> <li>• Therapeutic</li> <li>• Geriatrics</li> </ul>	1 <sup>st</sup> attempt: <ul style="list-style-type: none"> <li>• And</li> </ul> 2 <sup>nd</sup> attempt: <ul style="list-style-type: none"> <li>• And</li> </ul>
2. Medline – Ovid	1 <sup>st</sup> attempt: <ul style="list-style-type: none"> <li>• Multi-sensory stimulation</li> </ul>	1 <sup>st</sup> attempt: <ul style="list-style-type: none"> <li>• No limits used</li> </ul>
3. Medline - Ovid	1 <sup>st</sup> attempt: <ul style="list-style-type: none"> <li>• Williams &amp; Tappen</li> </ul>	1 <sup>st</sup> attempt: <ul style="list-style-type: none"> <li>• Looked for a specific article</li> </ul>

## INCLUSION and EXCLUSION CRITERIA

- Inclusion:

The article had to be related to treatment for the patient experiencing a type of dementia. The psychosocial treatment also had to be introduced post diagnosis and not be a preventative method. The original psychosocial issue addressed was depression. If other psychosocial symptoms were included in the study, it was accepted as long as depression was considered.

- Exclusion:

All articles found regarding the experience of the caregiver dealing with people with dementia. All articles addressing a specific type of dementia aside from Alzheimer's disease. All articles focusing on preventative approaches for developing dementia. One study was found regarding the effects of music therapy; however, it was received in a language other than English. Two studies were unavailable to the researcher upon request.

## RESULTS OF SEARCH

**Table 1:** Summary of Study Designs of Articles retrieved

Study Design/ Methodology of Articles Retrieved	Level	Number Located	Author (Year)
Systematic review	Ia	1	O'Connor, D., Ames, D., Gardner, B. And King, M. (2009)
Systematic review	Ia	1	Verkaik, R., VanWeert, J., Francke, A. (2005)
Randomized controlled trials	Ib	1	Baker, R. <i>et. al.</i> (2003)
Cohort – three groups repeated measure quasi-experimental design with random treatment	IIa	1	Williams, C. L. & Tappen, R. M. (2008)
Cohort – quasi-experimental design	IIb	1	Ozdemeir, L. & Akdemir, N. (2009)

## BEST EVIDENCE

The following study/paper was identified as the 'best' evidence and selected for critical appraisal. Reasons for selecting this study were:

- This is the one study that was found that displayed moderate evidence to treat anxiety and depression symptoms in people with dementia.

- It is a level II study design which is appropriate because people with dementia are a specific cohort
- It is the most recent article found regarding the effects of multi-sensory stimulation

## SUMMARY OF BEST EVIDENCE

**Table 2:** Description and appraisal of Effects of multisensory stimulation on cognition, depression and anxiety levels of mildly-affected Alzheimer's patients by (Ozdemir & Akdemir, 2009).

### **Aim/Objective of the Study/Systematic Review:**

This study was conducted to ascertain the effects of musical therapy, painting inanimate-object pictures, and orientation to time-place-person interventions on the cognitive state, depression, and anxiety levels of institutionalized mildly-affected Alzheimer's patients (Ozdemir & Akdemir, 2009).

### **Study Design:**

This study is a quasi-experimental design which was used to examine the impact of multisensory stimulation on mildly-affected Alzheimer's patients. The design of the study is cohort. This is an appropriate design because to become a participant in this study and to give valid data you have to have Alzheimer's disease. A cohort design is a group of people who have been exposed to a similar situation, for example a program, or a diagnosis/disease. The measurement tools used in this study were applied one day prior to beginning the study, immediately after its completion, and three weeks later (Ozdemir & Akdemir, 2009).

**Setting:** The exact setting of this study was not specified.

### **Participants:**

The recruitment of the sample was carried out according to the "proportional cluster sampling" method at the 75<sup>th</sup> Year Rest and Care Home, which was the only institution that could provide the sampling number. 25 participants were needed for the study using the formula for "sample size for a single-sampling average". However, 27 people mildly affected with Alzheimer's disease were recruited in case of drop-outs. Of the participants, 59.3% were aged 81 and above, 74.1% were women, 51.9% were high school or university graduates, 55.6% had been previously actively employed and 81.5% had children (Ozdemir & Akdemir, 2009).

### **Intervention Investigated**

*Control:* There is no control group in this study.

*Experimental:* Prior to beginning the activity, the participants were asked to write their first and last names, the date, and the name of their current location at the bottom of the drawing paper. After completion of the painting activity, they were asked to write down the name of the object they had just painted. During the organized activities, mental stimulation was ensured with orientation to time-place-person, object definition and the use of colors and music. Groups of 4-5 participants were formed according to the individuals' musical tastes,

and a total of 12 activity sessions were arranged in a three-week period, with four weekly sessions per group. As one of the interventions of the study, musical therapy was introduced using instrumental music with a light tempo and also took into consideration the preferences of the participants. The “Inanimate and Animate Object Picture Painting,” involving both coloring and hand-drawing, was used in this study. This activity includes 12 picture categories with one category assigned to each session. Each category contains four pictures, and the participant is asked to choose only one picture from this subcategory. These categories of pictures consist of fruits, foods, clothing, household goods, electronic goods, people, animals, vehicles, professions, nature, seasons, and free-hand drawings of the individual’s choice (Ozdemir & Akdemir, 2009).

### **Outcome Measures**

Analysis of scales over the total score regardless of time was accomplished with “single-factor repeated measurements”. Analysis taking time element into consideration was done with the “multifactorial repeated measurements”. Repeated measures are when subjects are correlated and measurements are taken more than two times. Statistical test used for repeated measures is ANOVA which reduces error variance and results in a larger F-ratio (Kielhofner, 2006). The correlation between the scales was assessed using “Pearson Correlation”. Pearson Correlation uses the correlation coefficient to express the strength of the relationship between two variables. Strongest correlations are 1.00 or – 1.00 and if there is no correlation, the coefficient is 0. (Kielhofner, 2006).

### **Main Findings:**

The changes over time in the MMSE scores were significant ( $p=0.001$ ). A negative significant correlation was observed between the MMSE-depression scores (correlation = 0.572,  $p = 0.001$ ) and MMSE-anxiety scores (correlation = -0.463,  $p = 0.001$ ). The correlation between the depression-anxiety scores obtained from repeated measurements had a positive significance (correlation = +0.730,  $p=0.001$ ). A positive significant correlation between MMSE and time (correlation= 0.730,  $p = 0.001$ ). A negatively significant correlation between depression-and-anxiety and time (correlation = - 0.351,  $p=0.001$ ; correlation = -0.326,  $p=0.003$ ) were also found. The analysis of the data highlighted that the changes occurring over time in the depression scores were statistically significant ( $p=0.001$ ). Pairwise comparison also showed the significant difference ( $p=0.001$ ) across the depression scores acquired for all measurements. The mean total depression scores demonstrated that the difference between the depression score and socio-cultural activities, reading books and newspapers, and playing chess-backgammon were significant ( $p=0.033$ ;  $p=0.030$ ,  $p=0.045$ ,  $p=0.042$ ). (Ozdemir & Akdemir, 2009).

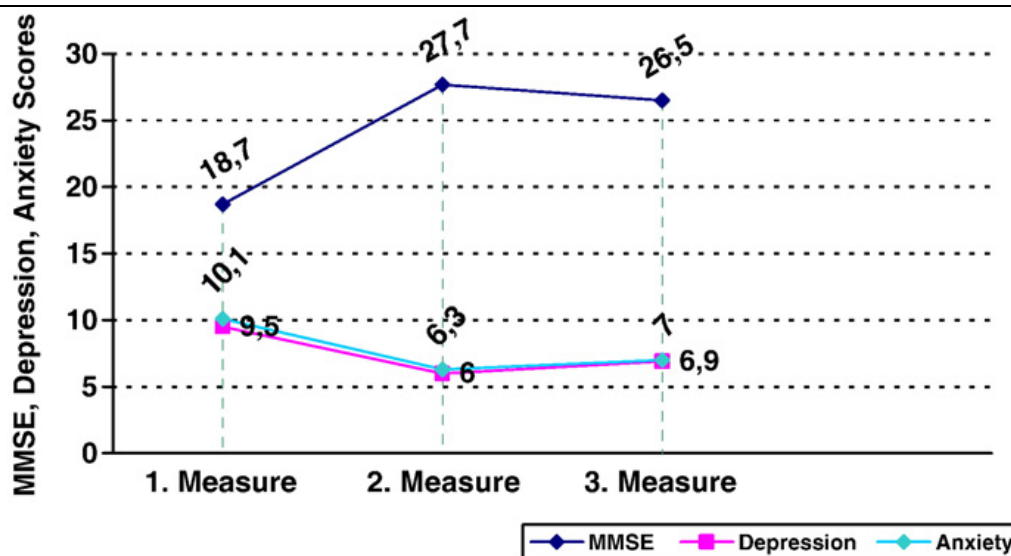


Figure 1. Correlations between mini mental state examination, depression and anxiety scores' changes in repeated measurements.

### Original Authors' Conclusions

The primary conclusion of the study is that the multisensory stimulation method implemented to mildly-affected Alzheimer's patients has a positive effect on their cognitive state, and depression, and anxiety levels. Furthermore, this effect lasted for three weeks following completion of the study, with a tendency to decline progressively (Ozdemir & Akdemir, 2009 p. 213).

### Critical Appraisal:

#### Validity

This study was biased as the investigators indicated on an established overall aim, which was to create and test a new technique, which might contribute to the relief of certain cognitive and psychological symptoms of mildly-affected Alzheimer's patients. Consequently, this paper will be framed positively regarding the multisensory approach. The researchers are seeking for improvements in treatment with patients who have Alzheimer's and have a hope, which may be a false positive hope in what works. Based on the critical appraisal for a cohort study, most of the data and information is provided. However, one can't tell if this study was accurate in minimizing bias in the sense that it was not specified if all the subjects into exposure groups were using the same criteria and whether or not the subjects and/or the outcome assessors blinded to exposure. Confounding factors were not addressed in this study. For example, time of day data was collected, interactions between the participants, lists of current medications, hours of sleep the participant received prior to data collection, patients general affect and behavior, food intake, and positioning in chair or wheelchair were all not addressed in the study and may be confounding factors to the data.

#### Interpretation of Results

The study shows that mini mental status exam scores were significantly different. Depression and anxiety scores significantly changed as a result of multisensory stimulation. However, the change in scores did not last longer than three weeks. O'Connor et al. (2009) concludes that Baker et al. (2003) provided a typical stimulation room with taped music, aroma, bubble



tubes, fiber-optic sprays and moving shapes projected across the walls. Eight 30-minute sensory stimulation sessions were compared with direct activities such as card games and quizzes. They were randomly assigned and neither treatment changed staff ratings on a scale of contentment, anxiety and alertness during or after sessions. Verkaik, vanWeert and Francke (2005) states there is some scientific evidence that people with moderate to severe dementia (MMSE 0 – 17) and high care dependency, are less apathetic when remaining in a multi-sensory stimulation/Snoezel room than when receiving activity therapy or staying in the living room. There are different interpretations of multisensory stimulation across these studies. The amount and type of stimulation needed and used demonstrate different results and outcomes. Although some results support the use of multisensory stimulation and some results do not support the use of this treatment, multisensory stimulation may have a positive effect on people with dementia.

### **Summary/Conclusion:**

This study states that there multisensory stimulation has a positive effect on cognitive state, depression and anxiety levels in people with dementia. However, the positive effects only lasted three weeks following completion of the study and there was a tendency to decline progressively. Verkaik, vanWeert, and Francke (2005) support this data and state there is some evidence that multi-sensory stimulation/Snoezelen in a multi-sensory room reduces apathy in people in the latter phases of dementia. However, two other studies oppose these results. Baker et al. (2003) states MSS was not found to be more effective than activity in changing the behavior, mood or cognition of patients with dementia, in the short- or long-term. While O'Connor et al. (2009) agree that multi-sensory stimulation proved no more effective in treating psychological symptoms than it did in treating behavioral ones and its random lights, sounds and shapes disturb some people with dementia. Two studies support the effectiveness of multisensory stimulation while two studies conclude no statistical evidence. Therefore, there is little reason to disregard the use of multisensory stimulation in treatment, nor is there any reason to support.

### **CHARACTERISTICS OF INCLUDED STUDIES**

<b>Study 1 (Verkaik, vanWeert &amp; Francke, 2005)</b>	
<b>Intervention investigated</b>	This systematic review seeks to establish the extent of scientific evidence for the effectiveness of 13 psychosocial methods for reducing depressed, aggressive or apathetic behaviours in people with dementia.
<b>Comparison intervention</b>	The ten psychosocial methods distinguished by the APA were used including: behavior therapy, supportive psychotherapy, validation/integrated emotion-oriented care, multi sensory stimulation/Snoezelen, simulated presence therapy, reminiscence, gentle care, passivities of daily living, reality orientation, skills training, activity/recreational therapy, art therapy, and psychomotor therapy.
<b>Outcomes used</b>	Only studies using depression, aggression or apathy as an outcome measure were included.
<b>Findings</b>	1 – There is some evidence that multi-sensory stimulation/Snoezelen in a multi-sensory room reduces apathy in people in the latter phases of dementia.

	<p>2 – There is scientific evidence, although limited, that Behavior Therapy-Pleasant Events and Behavior Therapy-Problem Solving reduces depression in people with probable Alzheimer’s disease who are living at home with their primary caregivers.</p> <p>3 – There is limited evidence that psychomotor therapy groups reduce aggression in a specific group of nursing home residents diagnosed with probable Alzheimer’s disease.</p>
<b>Study 2 (O’Connor, Ames, Gardner &amp; King, 2009)</b>	
<b>Intervention investigated</b>	This is a systematic review of selected experimental studies of the effectiveness of psychosocial treatments in reducing psychological symptoms in dementia such as anxiety, depression, irritability, and social withdrawal.
<b>Comparison intervention</b>	The primary interventions include: music, person-centered care, physical activity, simulated family presence, recreation, relaxation, reminiscence therapy, sensory enrichment and validation therapy.
<b>Outcomes used</b>	The interventions used measured effectiveness of psychosocial treatments in reducing psychological symptoms in dementia such as anxiety, depression, irritability and social withdrawal.
<b>Findings</b>	Of the three studies of exercise, movement and relaxation, only the one by Williams and Tappen (2007) found that one treatment (a gentle, comprehensive exercise program) worked better at reducing psychological symptoms than another treatment. Music therapy stood out as an effective treatment of behavioral symptoms of dementia, especially when tailored to reflect participants’ previous tastes (O’Connor et. al., 2009). Multi-sensory stimulation proved no more effective in treating psychological symptoms than it did in treating behavioral ones and its random lights, sounds and shapes disturb some people with dementia (O’Connor et. al., 2009). Validation and reminiscence therapies both performed better than control conditions, albeit to modest degree. Carer education, music, physical exercise, recreation, and validation therapy reduced psychological symptoms better than attention control conditions but the level of evidence is hardly compelling.
<b>Study 3 (William &amp; Tappen, 2008)</b>	
<b>Intervention investigated</b>	The purpose of this study was to examine the effects of exercise training on depressive symptomatology and mood in depressed nursing home residents with AD disease.
<b>Comparison intervention</b>	This study was a three-group, repeated-measures quasi-experimental design with random assignment to treatment group. The three groups were comprehensive exercise, supervised walking, and social conversation.
<b>Outcomes used</b>	Interventionists completed a treatment log after each session

	and recorded details of each exercise session including length of session in minutes, participant's response and explanations for any missed sessions.
<b>Findings</b>	This study concluded exercise approaches to treatment of depression in nursing home residents with severe AD evidenced a clear benefit to participants. Results suggest an important role for behavioral approaches to treating dysphoric mood in AD.
<b>Study 4 (Baker <i>et. al.</i>, 2003)</b>	
<b>Intervention investigated</b>	This study aimed to test whether or not multi-sensory stimulation (MSS) is more effective than a control activity of playing cards, looking at photographs, doing quizzes, etc. in changing the behavior, mood and cognition of older adults with dementia.
<b>Comparison intervention</b>	The effect of eight standardized MSS sessions was compared with a credible control of eight activity sessions in patients with moderate to severe dementia using a randomized controlled trial design. Activity sessions were chosen as a control as they were frequently used with patients with dementia.
<b>Outcomes used</b>	Two types of assessments were used; short-term assessments to investigate the immediate effects of sessions before, during, and after each session and long-term assessments to investigate any carry-over effects to patient's behavior, mood, and cognition on the ward and/or at home and the endurance of any effects 1 month after sessions. These were carried out pre-, mid-, post-trial and follow-up.
<b>Findings</b>	MSS was not found to be more effective than activity in changing the behavior, mood or cognition of patients with dementia, in the short- or long-term.

### **IMPLICATIONS FOR PRACTICE, EDUCATION and FUTURE RESEARCH**

Overall, this study scored well on critical appraisal. The only real unidentified area was decreasing the confounding factors and minimizing bias. The major limitation to all the studies measuring the effects of multisensory stimulation is the small number of participants. This intervention is increasingly becoming popular and recognized in treatment. As a current MOT student we are learning about the possible effects of multisensory stimulation in treatment. However, many practitioners may not be aware of the possible benefits from multisensory stimulation. Research should be encouraged to determine possible benefits when using this treatment. Depending on the types of items chosen to stimulate or inhibit the different senses, the overall concept may be fairly inexpensive and accessible. Other future research should be done on specific sensory stimulations used in attempt to create a set combination of multisensory stimulation. This will increase the standardization of the possible treatment and will increase the likelihood of evidence based significant differences. Once standardization is established, individual preferences will be incorporated into the process and treatment. For now however, conclusive evidence for using this approach with individuals with dementia is not available.

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